

D.T.E. 01-66

Investigation by the Department of Telecommunications and Energy on its Own Motion into  
the Service Quality of Western Massachusetts Electric Company

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FOR: WESTERN MASSACHUSETTS ELECTRIC  
COMPANY  
Respondent

## I. INTRODUCTION

On August 24, 2001, the Department opened an investigation into the service quality of Western Massachusetts Electric Company (“WMECo” or “Company”) (“Notice Opening Investigation”). The Department stated that the focus of this investigation would be WMECo’s management of its distribution system. The Department specifically directed WMECo to provide information in the following areas: growth forecasting; communication and notification procedures during outages; use of emergency generators and other equipment; personnel staffing and deployment during outages;<sup>1</sup> weather forecasting; and maintenance and design of its distribution system. The Department docketed this proceeding as D.T.E. 01-66.

On October 29, 2001, WMECo filed a report assessing its distribution system’s reliability (“Report”). The Department held two public hearings on November 28, 2001 and November 29, 2001 in WMECo’s service territory.<sup>2</sup> The Department also held a public hearing at our offices on January 15, 2002. At these hearings, the Department took comments

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<sup>1</sup> By letter dated September 12, 2001, the Department requested the following additional information regarding personnel: (1) adequacy of staffing levels for operation and maintenance of the distribution system, including inspection staffing levels; (2) identification and description of all training programs for employees engaged in electric service operation and restoration efforts; and (3) a cost/benefit assessment of establishing a program of periodic (*i.e.*, over a specified cycle of years) inspection of both above-ground and underground distribution plant to be conducted by personnel who are expressly dedicated to inspection.

<sup>2</sup> The Department held the public hearings in Pittsfield and Greenfield, Massachusetts.

on the Report from elected public officials, representatives of the Commonwealth agencies, and members of the public.<sup>3</sup>

## II. WMECo's REPORT

### A. Introduction

WMECo's Report includes a review of the areas of inquiry raised by the Department as well as a description of the measures that WMECo is implementing, or has planned, to improve system reliability. This Order assesses WMECo's management of its distribution system by reviewing WMECo's performance in the areas of which the Department inquired. In making this assessment, the Department exercises its supervisory authority pursuant to G.L. c. 164, § 76 without managing the daily activities of the Company. See New England Telephone and Telegraph Co. v. Department of Public Utilities, 360 Mass. 443, 466-468, 483-484, 489 (1971) (interference with exercise of judgment by company business management is beyond Department's regulatory power and authority). Finally, the Order summarizes the recommendations and reporting requirements made throughout this Order.

### B. Growth Forecasting

#### 1. WMECo

In its Notice Opening Investigation, the Department requested information regarding the adequacy of WMECo's growth or load forecasting at the community, business district, or

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<sup>3</sup> The public hearings shall be identified chronologically according to the date of each hearing (i.e., Tr. 3 shall refer to the public hearing at the Department's offices on January 15, 2002).

neighborhood level. The Department also solicited comments regarding improvements that could be made to WMECo's load forecasting process.

In response, WMECo states that it develops a load forecast for each of its substations and circuits (Report at 5).<sup>4</sup> Each load forecast includes both summer and winter peak periods (*id.*). Based on historical loads, WMECo uses a load growth factor of one percent per year in its analysis (*id.*). Each load forecasts projects substation and circuit loads for a period of seven years (*id.*).

WMECo states that, based on its recent review, it plans to make three improvements to its load forecasting process (*id.* at 6). First, WMECo will begin ten-year forecasts (*id.*). Second, WMECo will use five years historical data in its load forecasts instead of three years and will use the highest peak load in last five years as a starting point for the forecasting process (*id.*). Third, WMECo is acquiring a new load forecasting software called the Load Estimating Analysis Program ("LEAP") (*id.*).

## 2. Analysis and Findings

The Department has long reviewed utility load forecasts. In the past, we have reviewed load forecasts with a view toward generation adequacy. See 220 C.M.R. §§ 10.00 et seq. In this review, however, the Department's analysis focuses on the Company's use of load forecasts in the operation of the distribution system. See Order Commencing a Notice of

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<sup>4</sup> WMECo has a dedicated group of employees, consisting of a centralized engineering analysis group and field-located Circuit Owners, who develop the load forecasts.

Inquiry into (1) rescinding 220 C.M.R. §§ 10.00 et seq. and (2) exempting electric companies from any or all of the provisions of G.L. c. 164, § 69I, D.T.E. 98-84/EFBS 98-5 (1998).

Load forecasting is a very important component of transmission and distribution (“T&D”) facilities’ expansion or upgrade planning. Accurate load forecast allow planning engineers to simulate the behavior of transmission lines, distribution lines, and the equipment in between them. Accurate load forecasts, together with the correctly-modeled, planning databases in the distribution analysis software, allow engineers and management to envision future problems likely to happen through distribution system simulation during normal operating conditions and also during emergency conditions. Results of these simulations allow management to allocate necessary resources properly. Under-forecasts could stress the system beyond its capability and jeopardize the ability to serve customer load, and would make the distribution system more susceptible to frequent breakdown at various locations.

Over-forecasts could unnecessarily result in excessive capital and human resources need estimates, ultimately leading to an over-built system needlessly costly to ratepayers.

The steps that WMECo has taken, including the acquisition of the LEAP forecasting software, may improve the long-range forecasting process and distribution facilities planning. Nonetheless, WMECo has overlooked certain actions that will enhance its forecasting ability, which we will discuss below.

First, WMECo’s use of a uniform system-wide growth rate (one percent) in formulating load forecasts does not allow disaggregation of load growth based on the specific load characteristics of individual substations, including land use. It also does not take into account

the new industrial or commercial step load expected in specific areas in future years. Applying a system-wide growth rate in formulating load forecasts uniformly across the system could skew the T&D planning process for the necessary upgrades.

Second, WMECo has included neither the probability levels nor some statistically reliable means by which the normal and the extreme weather forecasts will be calculated. Extreme weather conditions occur in WMECo's service territory. Accordingly, not only must specific-area extreme weather be considered but also some coincident or non-coincident factors need to be applied when using these forecasts for a given area, sub-station or a particular feeder. Therefore, WMECo should consider using extreme weather peak forecasts for planning T&D facilities during normal and emergency (contingency) conditions.

Third, WMECo has not addressed the potential of demand-side management ("DSM") measures to reduce load in its forecasts. DSM programs, such as the use of efficient equipment in homes, reduce energy consumption overall in the system. Together with energy efficiency and load-shifting applications, DSM programs can reduce overall peak demand. Therefore, the effect of DSM programs needs to be incorporated in WMECo's load forecasting process.

Fourth, WMECo has not addressed the effect of peak load shaving or load shedding implemented by certain customers (industrial or commercial). During the inevitable times of peak load, there are customers who are willing to reduce their load. By reducing their load, peak demands can be reduced, which will reduce the stress on the distribution system.

Therefore, the effect of peak load shaving or load shedding needs to be incorporated in load forecasting.

Fifth, WMECo has not addressed the effect of T&D system losses on the peak demand forecasts. T&D system losses are an integral part of a total system load that need to be considered in serving customer load. By using more efficient equipment, such as transformers, large wires and capacitors, the magnitude of peak load demand required at the system level could be reduced. Therefore, WMECo needs to address the use of more efficient transformers and wires in its load forecasting process.

Based on the foregoing, the Department finds that while the steps WMECo has undertaken may improve its load forecasting ability, there are further steps that WMECo should take. Therefore, the Department directs WMECo to consider including the following in its load forecasting process and to report back by June 1, 2002 on the value and feasibility of these measures:

1. The means, including probability levels, by which the normal and the extreme weather forecasts of various sub-station(s), and the system as a whole, can be determined
2. The effect of equipment efficiency programs (DSM programs) on reducing peak load forecasts;
3. The effect of peak load shaving or load shedding applications/incentives on reducing peak load demand forecasts;
4. The effect of T&D system losses, and measures to reduce them, on system-wide peak demand forecasts; and
5. The use of extreme weather peak demand forecasts which ultimately would be applied in planning facilities during normal as well as contingency or emergency conditions.

The Department also directs WMECo to submit annually ten-year peak demand load forecasts for both summer and winter. The forecasts should also include, but not be limited to, all of the factors discussed above.

C. Communications and Notifications Procedures

1. WMECo

In its Notice Opening Investigation, the Department requested information regarding the appropriateness of WMECo's communications and notifications procedures. In particular, the Department sought information regarding procedures during outage and storm recovery, both internal to the Company and between the Company and the following entities: municipalities, affected neighborhoods, political leaders, and regulators. The Department made specific inquiry into WMECo's use of accurate and real-time updates.

WMECo responds that it is aware of the importance of communicating restoration efforts to municipalities, political leaders, regulators, and customers (Report at 2). WMECo states that it has several avenues in place to accomplish this task (id.).

With respect community communications, WMECo states that it has an Emergency Plan, which is updated annually, that reflects relevant community information (Tr. 3, at 9; Report at 17). In addition, WMECo states that it annually updates a list of priority customers and key public officials for each community (Report at 17). Further, WMECo states that it provides damage assessment training for community emergency personnel (id. at 18).

With respect to communications within the Company, WMECo states that local outages are tracked and managed via the Trouble Call and Interruption Analysis System operated by the Systems Operations Center ("SOC") (id.). Dispatchers in the SOC input outage information, allowing WMECo's employees to relay accurate information to customers who call (id. at 19). For larger or significant outages, WMECo's district general managers will



make customer contacts to assist with outage management (id.). WMECo also states that it will soon have detailed customer outage information available on its website (id. at 19).

Finally, WMECo states it has been working with the Department on the outage reporting protocol (“ORP”) (Tr.3, at 16). WMECo states that it currently notifies the Department, as well as municipal officials, within a half-hour of major outages (id.). WMECo asserts that it is also working to include information regarding storms (id.).

## 2. Analysis and Findings

WMECo avails itself of reasonable communication and notification procedures. These procedures include placing information on its website and complying with the Department’s ORP, which requires regular updating of lists of key contacts at both the municipal and the Department level. WMECo, however, has not provided progress reports on either its website updates on outages or its implementation of the ORP. Therefore, the Department directs WMECo to provide the following:

1. A schedule and a progress report regarding adding customer outage reports to the website; and
2. The method and regularity by which its key contact list will be updated, consistent with the ORP requirements.

## D. Use of Emergency Generators and Other Equipment

### 1. WMECo

In its Notice Opening Investigation, the Department requested information regarding the adequacy of WMECo’s deployment of emergency generators and supply of equipment to restore critical service or ease prolonged interruptions. WMECo responds that it has mobile transformers and spare equipment to use during emergency conditions (Report at 21-22).

WMECo states that it does not own any generators to be used for power restoration because its approach to restoration is to use switching, to make permanent repairs, or to deploy temporary lines and cables (*id.* at 21).

2. Analysis and Findings

WMECo believes that it is adequately prepared to restore service during outages because of its restoration approach. WMECo, however, fails to assess the need for the availability of emergency generators where the loss of supply to a particular area would best be remedied by installing mobile generators because the repair of the failed equipment would take extended periods of time. Therefore, the Department directs WMECo to include the following in a report due June 1, 2002:

1. A contingency analysis showing the need, if any, of emergency generators and its deployment procedure in the WMECo system; and
2. A survey of WMECo's large institutional customers, including hospitals, schools, and municipal buildings, that assesses whether these customers have adequately sized their own back up generation and have in place proper deployment procedures.

E. Personnel Staffing and Deployment

1. Personnel Availability

a. WMECo

In its Notice Opening Investigation, the Department requested information regarding the soundness of personnel availability and work crew call-up and deployment procedures. WMECo responds that it has an automated call-out system to call in additional workers to respond to outages (Report at 15). WMECo states that calls are first made to employees within the outage district, then to employees from neighboring districts to obtain the needed staffing

levels (id.). Furthermore, WMECo states it may call upon the resources of its parent company, Northeast Utilities (“NU”), as well as other utilities, in times of need (id. at 16).

WMECo reports a 100 percent response success rate once a call-out is initiated (id.). However, the individual(s) responding are from the local district about 75 percent of the time and from a neighboring district approximately 25 percent of the time (id.). WMECo is currently working to continue to provide incentives to improve local response rates, particularly in smaller districts, as well as provide additional personnel on call to ensure full time coverage (id.).

b. Analysis and Findings

The Department finds that current staff procedures should not be allowed to deteriorate, and special attention needs to be paid to those months when high demand and extreme weather are most likely to coincide. At such times, staffing levels are of most acute concern. Furthermore, the Department directs WMECo to report the status of incentive programs by June 1, 2002.

2. Weather Forecasting

a. WMECo

In its Notice Opening Investigation, the Department also sought information regarding WMECo’s weather forecasting. WMECo responds that it relies on multiple resources to monitor and evaluate weather conditions (Report at 14). According to WMECo, it uses a weather service with whom its parent company, NU, contracts (id.). WMECo states that the real time data available from this service include storm intensity, precipitation type and

quantity, as well as wind and lightning conditions (id.). In addition, WMECo states that it also monitors the Weather Channel and obtains forecasts from the National Weather Service (id.).

b. Analysis and Findings

WMECo avails itself of reasonable avenues of weather forecasting and operates in accordance with the practices of the industry. The Company, however, must ensure that it maintains a close nexus between forecast reports of extreme weather and adequate staffing of both line crews and the consumer call center commensurate to those reports. While WMECo has detailed how it uses the weather information regarding deployment of its line crews, it provides no details regarding its use in its call center. Therefore, the Department directs WMECo to report back on how it maintains the nexus between forecast reports of extreme weather and its customer call center by June 1, 2002.

3. Employee Staffing Levels

a. WMECo

In its Notice Opening Investigation, the Department requested information regarding the adequacy of employee staffing levels for operation and maintenance of the distribution system, including inspection staffing levels. WMECo states that it has fully trained employees that can perform all levels of operation, maintenance, and inspection on the distribution system (Report at 25). WMECo contends that employees who operate equipment are apt to perform a more thorough inspection and complete maintenance than employees who do not operate the equipment (id.). The flexibility of having fully trained staff also allows for efficient use of

staff as they can switch between inspection, maintenance or restoration work depending upon the needs (id. at 26).

b. Analysis and Findings

The adequacy of properly trained staff to maintaining good service and to restoring service in a timely way after an outage is a matter of great importance. While WMECo has reported on the adequacy of staffing levels for the employees who have the ability to inspect, maintain and provide restoration work as described, it has excluded the staffing levels that may be needed in its forecasting, distribution planning, distribution engineering, and field engineering departments. Therefore, the Department directs WMECo to address, by June 1, 2002, the adequacy of staffing levels needed in the forecasting, distribution planning, system planning, distribution engineering and field engineering departments and to identify the work load required.

4. Training Programs for Employees

a. WMECo

In its Notice Opening Investigation, the Department requested identification of all training programs for employees engaged in electric service operation and restoration efforts. WMECo responds that it provides several training programs for employees to maintain a well-trained workforce (Report at 2). WMECo lists three programs: (1) a time merit program for training field personnel such as line worker, splicer, electrician and other disciplines; (2) a skill enhancement and recertification training program, including OSHA's safety requirements for employees working with electrical distribution plant, such as switching and tagging

training, hazard assessment, and proper grounding for protection; and (3) environmental training (id. at 23-25).

b. Analysis and Findings

While WMECo's training programs for employees engaged in all areas of activities related to customer outages are acceptable, the Department directs WMECo to report by June 1, 2002 on the training of new employees that may be hired not only in the maintenance area but in all activities related to customer outages and restoration of electric services.

5. Inspection of Above-Ground and Underground Distribution Plant

a. WMECo

In its Notice Opening Investigation, the Department requested a cost-benefit assessment of establishing a program of periodic inspection of both above-ground and underground distribution, to be conducted by personnel who are expressly dedicated to inspection. WMECo responds that it has employees who are capable of (1) operating its distribution system and (2) providing maintenance work and inspection as required (Report at 26). WMECo asserts it had no major outages during the Summer of 2001 due to its cost-effective approach to providing reliable service (id.). WMECo claims that to employ additional workers dedicated to inspection would cost the Company \$1 million (id. at 27).

b. Analysis and Findings

The Department finds that, given the relatively small size of WMECo, a dedicated inspection force would significantly increase costs. The Company must ensure, however, that the field information obtained by WMECo's inspection and maintenance regarding the

condition, size, and performance of the distribution system components and infrastructures reaches the T&D planning engineers for their planning analysis. Therefore, the Department directs WMECo to consider having dedicated staff available to provide this field information to the distribution planning and system planning areas and to report back on the value and feasibility of doing so by June 1, 2002.

F. Maintenance and Design

1. Overall Maintenance Practices and Spares Inventory

a. WMECo

In its Notice Opening Investigation, the Department requested information regarding the adequacy of overall and particular community maintenance practices and of equipment and spares inventory to meet outage restoration demands. WMECo responds that its maintenance practices are extensive (Report at 1). In particular, WMECo adheres to NU's inspection and maintenance program to provide safe, reliable and economical service to its customers (id. at 7). As part of its preventative maintenance program, WMECo states that it includes tree trimming on a circuit-basis rather than a town-basis (id. at 9).

b. Analysis and Findings

While WMECo describes generally adequate maintenance procedures and inventory, it does not specify its activities in the Report. For example, tree interference with utility lines is one of the major causes of outage, and trimming is an essential management tool in outage prevention. That information is good insofar as it goes; but more is required. WMECo only tells us that it performs tree trimming on a circuit basis. The Department would like further

information regarding WMECo's practices in this area. Therefore, the Department directs WMECo to provide a quarterly report commencing June 1, 2002 of its tree trimming schedule, including documentation of cooperation with local communities, and inspection activities schedule listed by circuits.

2. Distribution Design

a. WMECo

In its Notice Opening Investigation, the Department requested the identification of distribution design flaws that led to repeated outages on particular circuits, especially circuits that serve critical community facilities. WMECo reports no fundamental technical flaws in the overall design of its distribution system. WMECo states, however, that it has several methods in place to identify and address design flaws within its distribution system (Report at 1). These efforts include the assignment of all circuits to designated circuit owners, who investigate all outages and electrical troubles for circuits to which they are assigned (id. at 1, 10-11). Finally, WMECo states that it also has a monthly meeting of the System Operational Review Committee, a board comprising of operations and engineering groups whose assignment is to review and ensure a proper course of action to prevent a recurrence of outage events (id.).

b. Analysis and Findings

WMECo has not provided the Department its distribution design and planning guide. Also, to apply proper application of planning studies, WMECo must have three-phase loadflow software to analyze and test contingencies for its distribution system. Therefore, the Department directs WMECo to take the following steps to improve its distribution design and



planning processes:

1. Provide complete planing criteria and distribution design guidelines for the distribution planning process;
2. Submit an operating study showing power flows and voltages for normal and emergency temperature conditions, including a contingency analysis, at each sub-station or bulk substation in WMECo's territory;
3. Provide a list of large institutional customers (including hospitals and municipal buildings) by town, their magnitude, the circuit on which they are fed, as well as WMECo's plans to provide electricity to them during most critical contingencies; and
4. Provide a list of significant T&D improvement projects, identifying their cause, prioritizing future projects, including a one-line schematic and geographical diagrams, as well as power-flow diagrams for each project.

### III. CONCLUSION

While there is no recent indication of repeated major failures in WMECo's distribution system, the Department directs WMECo to take further action with regard to the several areas described above. First, with respect to growth forecasting, WMECo should adjust its forecasting process to include several variables, including the effects of extreme weather, peak load shaving and DSM programs. Second, with respect to staffing, WMECo should address staff levels needed in the forecasting, distribution planning, system planning, distribution engineering and field engineering departments. Third, with respect to distribution design, WMECo should address certain fundamental design criteria to reduce or prevent future outages. Fourth, WMECo should provide further information regarding communication procedures and temporary restoration equipment, such as use of emergency generators. To ensure that WMECo completes its planned improvements and performs the directives in accordance with these plans, WMECo shall make the following annual reports, as well as the

following quarterly reports for the next two years beginning June 1, 2002:

1. Annual Reports Commencing January 1, 2003  
Ten-year peak demand load forecasts; planning criteria and guidelines for the entire distribution system planning process; an operating study report showing power flows and voltages for normal and emergency conditions; listing of critical loads by town; listing of significant reliability improvement and infrastructure improvement projects; prioritization of future projects; and
2. Quarterly or Progress Reports Commencing June 1, 2002 and Concluding June 1, 2004  
Listing of available emergency generators if needed, mobile transformers, and transformers as well as deployment procedures; listing of scheduled work regarding tree trimming and other maintenance activities.

In addition, on June 1, 2002, WMECo shall file with the Department a Summer 2002

Readiness Report, assessing (with supporting documentation) its expected ability to respond adequately this coming summer to a repetition, if there should be one, of the severe weather conditions experienced in the June-August 2001 period. To the extent any of the filing

requirements directed by the Department raise concerns regarding system security, the Company should follow normal procedures for protecting confidential information.

By Order of the Department,

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James Connelly, Chairman

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W. Robert Keating, Commissioner

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Paul B. Vasington, Commissioner

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Eugene J. Sullivan, Jr., Commissioner

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Deirdre K. Manning, Commissioner